Department of Computer Science and Engineering

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

Data Structures
LAB 1: Dynamic Memory Allocation

OBJECTIVE:

The objective of this lab is to use malloc(), calloc(), realloc() and free() functions to write a program involving a list of elements (not using static arrays) and structures.

1. Write a program that takes as input the size of two integer lists from the user. It then dynamically allocates memory for the lists and asks the user to input elements for both the lists. After the elements (integers) are entered the following operations are to be performed on the lists:

    a. **INSERTION:** Inserts an element at a specified location in the list (List 1 or List 2). The element (e) to be inserted and its position (p) are to be entered by the user. Before inserting the element in the list, remember to shift right by one all the elements from position p till the end of the list. These elements need to be shifted one right to accommodate the insertion of one element. Note: The list size is to be accommodated accordingly.

    b. **DELETION:** Deletes an element at a specified location in the list. The position (p) of the element or the element value is specified by the user. The elements following the element to be deleted are to be shifted one left to accommodate the deletion. Note: The list size is to be accommodated accordingly.

    c. **MERGING:** Traverses the two lists and merges them such that the new list that is created is a combination of the first two. If List 1 is {1,2,3} and List 2 is {4,5,6}, then List 3 is {1,4,2,5,3,6}. In case the lists are not equal in size the additional elements of the bigger list are just appended at the end. The memory allocation for the new list should be done using dynamic memory allocation. The newly created list should be printed out.

    d. **PRINT:** Prints the selected list.

    e. **EXIT:** Exits the program. The memory occupied by all the three lists should be freed.

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The Main Menu for the program should look like this:
main()
{   **/*initializations and variable declarations*/**
        Int choice=1;

        /* Ask the User to Enter Elements for List 1 and List 2*/
        printf("Welcome to List Manipulation using Dynamic Memory Allocation\n");
        printf("Enter the size of the first list: ");
        scanf("%d",&size1);
        printf("\nEnter the size of the second list: ");
        scanf("%d",&size2);

        While (choice)
        {
        printf("Enter your choice :\n");
        printf("1. Insertion");
        printf("2. Deletion");
        printf("3. Merging");
        printf("4. Print");
        printf("0. Exit");

        scanf("%d",&choice);
        /*For Choice 1,2,4 give a choice for the list you want to manipulate*/
        printf("Which list you want to operate, List 1 or List 2 :\n");
        scanf("%d", &lchoice);
        /* Based on this choice pass the selected list to the functions below*/
        switch(choice)
        {   case 1: /*Function call for Insertion*/
                       case 2: /* Function call for Deletion*/
                       case 3: /* Function call for Merging*/
                       case 4: /* Function call for Print*/
                        case 0: /* Exits*/
        }

}